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DRAFT REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES, FEASIBILITY STUDY PLAN, WORK PLAN, VOLUME 7 OF 7

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HARDING LAWSON ASSOCIATES

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FEASIBILITY STUDY PLAN
REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES
NAVAL STATION, TREASURE ISLAND
HUNTERS POINT ANNEX
SAN FRANCISCO, CALIFORNIA

DEPARTMENT OF THE NAVY
WESTERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
SAN BRUNO, CALIFORNIA 94066

A Report Prepared for

Western Division
Naval Facilities Engineering Command
900 Commodore Drive
San Bruno, California

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HLA Job No. 2176,132.02

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1.0 INTRODUCTION

This Feasibility Study Plan (FSP) has been prepared by Harding Lawson Associates (HLA) for the U.S. Navy's Naval Facilities Engineering Command, Western Division, to apply to work activities for the Feasibility Studies (FS) at the Naval Station, Treasure Island, Hunters Point Annex (HPA), San Francisco, California (Plate 1).

This FSP was prepared to be consistent with the following guidance documents:

- National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR), Part 300 (1986).
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C., Sections 9601 et seq.
- Scoping Document, Remedial Investigations/Feasibility Studies, Naval Station Treasure Island, Hunters Point Annex, San Francisco, California (*HLA, 1988a*).
- EPA guidance documents to the extent applicable: "Guidance on Feasibility Studies Under CERCLA," dated June 1985; "Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans," QAMS-005/80, dated December 29, 1980; "Draft Supplement to: Interim Guidelines and Specifications for Preparing Quality Assurance Project Plans, QAMS-005/80," dated January 1986; and undated and unnumbered guidance document, "QA/QC Requirements for Reviewing the Data Generated by Responsible Parties."

The Work Plan for the Remedial Investigation/Feasibility Study (RI/FS) at Hunters Point Annex consists of the following planning documents:

Volume 1	Project Management Plan
Volume 2A	Sampling Plan - Group I Sites
Volume 2B	Sampling Plan - Group II Sites
Volume 2C	Sampling Plan - Group III Sites
Volume 2D	Sampling Plan - Group IV Sites
Volume 2E	Air Quality Monitoring Plan
Volume 3	Quality Assurance Project Plan
Volume 4	Data Management Plan

Volume 5	Site Safety Plan
Volume 6	Public Health and Environmental Evaluation Plan
Volume 7	Feasibility Study Plan

This Planning Document is Work Plan Volume 7, the Feasibility Study Plan. Additional information, including past data validation and a schedule, is provided in the Scoping Document dated May 3, 1988.

Because of the complexity of HPA and the different chemicals that might be expected at each IR site, the Navy intends to investigate HPA on a site-by-site basis. As outlined in the Scoping Document (*HLA, 1988a*), individual sites will be combined into groups to facilitate reporting requirements. Formulation of these groups is based on evaluation of potential threats to humans and/or the environment, ease of investigation/ remediation. The 11 IR sites included in the RI/FS process have been assigned to the following groups:

Group I	IR-1	Industrial Landfill
	IR-2	Bay Fill Area
	IR-3	Oil Reclamation Ponds
Group II	IR-6	Tank Farm
	IR-8	Building 503 PCB Spill Area
	IR-9	Pickling and Plate Yard
	IR-10	Battery and Electroplating Shop (Building 123)
	IR-11	Building 521 Power Plant
Group III	IR-4	Scrap Yard
	IR-5	Old Transformer Storage Yard
Group IV	IR-7	Sub-Base Area

This group approach is a working model and is intended to be flexible. Data obtained throughout the RI will be used to revise the site groupings where appropriate; additional sites and/or groups may be added as data are developed. The FS has been designed to utilize RI-generated information to characterize the sites to an extent that

appropriate remedial actions can be selected. Should additional site characterization information be required to support remedial action(s) selection for specific sites, such information will be collected as the FS progresses.

2.0 OBJECTIVES

The objective of the FS is to define and evaluate alternative courses of remedial action that could be used to mitigate conditions identified at the HPA site during the Remedial Investigation (RI). The end result of the FS is the selection of a preferred alternative that is technically sound, addresses public health and environmental concerns appropriately, is consistent with applicable or relevant and appropriate requirements (ARARs), and is the most cost-effective of the alternatives offering similar benefits.

The RI and FS are interrelated, iterative processes that are performed concurrently. The RI emphasizes data collection and site characterization, and the FS emphasizes data analysis and evaluation of remedial alternatives.

This FS Plan includes a description of specific FS activities and their associated tasks. This discussion includes a brief description of methodologies and applicable criteria that are expected to be used in the screening process.

3.0 LEGALLY APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS)

In addition to the RI/FS guidance cited in Section 1.0, Section 121(d) of CERCLA, as amended by SARA, requires that remedial actions achieve a level of cleanup that meets "legally applicable or relevant and appropriate requirements" (ARARs). ARARs include any standard, requirement, criteria, or limitation under any Federal environmental law or any promulgated standard, requirement, criteria, or limitation under State environmental law that is more stringent than the Federal requirements. Examples of ARARs include the Toxic Substances Control Act, the Safe Drinking Water Act, and the Solid Waste Disposal Act.

The purpose of the ARARs is to provide cleanup standards to protect human health and the environment. Three separate categories of ARARs as defined by EPA (*1987b*) are:

1. Ambient or chemical-specific requirements that set health or risk-based concentration limits or ranges for particular chemicals in various environmental media (e.g., MCLs)

2. Locational requirements that set restrictions on activities depending on the characteristics of the site and surrounding area (e.g., federal or state siting laws for hazardous waste facilities)

3. Performance, design, or other action-specific requirements that set controls or restrictions on particular kinds of activities (e.g., RCRA incineration standards)

During the RI data evaluation at HPA, a preliminary set of potential chemical- and location- specific ARARs that may be applicable to remedial actions will be developed. These preliminary ARARs will be further evaluated and additional ARARs will be identified during the remaining phases of the RI/FS process. The ARAR development will proceed concurrent with and in conjunction with the Public Health

Environmental Evaluation (PHEE). The final ARARs will be identified based on 1) contaminants found in the various site media; 2) the demographic characteristics of HPA; and 3) the type of final remedial actions. In general, identification of ARARs will include the following four steps:

1. Chemicals of concern will be identified in the various media in which they occur.

2. Potential or actual uses of the affected media will be identified.

3. Based on the uses identified in Step 2, ARARs for each chemical in each medium will be identified.

4. Possible remedial action alternatives that can attain the required level of cleanup will be evaluated and the ARARs associated with each of these actions will be identified.

The Navy will identify final ARARs using methodologies presented in appropriate EPA guidance documents (*EPA, 1986; 1987b, 1985c*).

Section 121(d)(4) of CERCLA, as amended by SARA, provides that a cleanup standard that assures protection of human health and the environment but which does not attain the level of an ARAR may be selected if:

- The remedial action is only part of the total action that will ultimately attain the level of an ARAR;
- Compliance with an ARAR will result in greater risk to human health and the environment than alternative options;
- Compliance with an ARAR is technically impractical;
- The remedial action selected will achieve an equivalent level of cleanup through another method or approach;
- A state has not consistently applied a state ARAR in similar circumstances with other remedial actions within the state;

One or more of these circumstances may be relevant to remedial actions at HPA. These circumstances will be evaluated as the RI/FS proceeds and remedial actions are

selected. ARARs may be waived if the selected remedial measure falls in one or more of the categories shown above and but is nevertheless protective of human health and the environment.

4.0 FEASIBILITY STUDY PROCESS

The Navy will conduct an individual FS for each of the four groups of sites defined in Section 1.0. Additional individual sites will be added as appropriate depending on the results of further evaluation of the remainder of the facility. This further evaluation includes performance of Preliminary Assessment/Site Investigation (PA/SI) for the "other areas." Each FS will comprise the four major tasks outlined below. The objective of each FS is to develop a site-specific remedial alternative for each site in each group that is technically sound and cost effective, and that meets environmental, public health, and institutional criteria. However, to the extent possible, the FS process will consider the effects of remediation on adjacent sites and combining remedial alternatives for multiple sites to minimize costs. The following outline depicts each FS task and subtask that is expected in the FS process.

Task 1.0 - Identify Technologies and Develop Remedial Alternatives
- Task 1.1 - Establish Remedial Response Objectives
- Task 1.2 - Identify Potential Treatment Technologies
  - Task 1.2.1 - Identify Preliminary Categories of Responses
  - Task 1.2.2 - Identify Potential Remedial Technologies
- Task 1.3 - Screen Technologies and Develop Remedial Alternatives

Task 2.0 - Conduct Initial Screening of Alternatives
- Task 2.1 - Perform Technical, Environmental, and Public Health and Screening of Alternatives
- Task 2.2 - Prepare Preliminary Cost Estimates

Task 3.0 - Prepare Detailed Evaluation of Alternatives that Meet Initial Screening Criteria
- Task 3.1 - Evaluate Alternatives
  - Task 3.1.1 - Technical Evaluation
  - Task 3.1.2 - Environmental Evaluation
  - Task 3.1.3 - Public Health Evaluation
  - Task 3.1.4 - Institutional Evaluation
  - Task 3.1.5 - Cost Analysis
  - Task 3.1.6 - Cost Summary

Task 3.2 - Summarize Evaluation of Alternatives
Task 3.3 - Select Remedial Action Alternatives

Task 4.0 - Prepare Feasibility Study Report
Task 4.1 - Prepare Draft FS Report
Task 4.2 - Prepare Final FS Report

Plate 2 is a flow chart illustrating the FS process and the relationships between the tasks. The following discussion describes each task and how information from each task will be used to develop the next task.

4.1 Task 1.0 - Identify Technologies and Develop Remedial Alternatives

This task involves three subtasks--the establishment of remedial response objectives (Task 1.1), the identification of potential treatment technologies suitable for the site, (Task 1.2) and the development of combinations of these technologies into remedial alternatives based on site-specific remedial response objectives (Task 1.3).

4.1.1 Task 1.1 - Establish Remedial Response Objectives

The first step in defining remedial alternatives (RAs) is to identify potential remedial response objectives (RROs). EPA has identified two distinct types of RROs, 1) objectives for source control measures that significantly minimize migration of contaminants from a site; and 2) objectives for management of migration measures that eliminate or reduce the impacts resulting from contamination from a site. Site-specific RROs will be developed according to findings of the RIs.

4.1.2 Task 1.2 - Identify Potential Treatment Technologies

The purpose of this activity is to 1) identify the general types of response categories that may be necessary to address the site problems detected during the RI, and 2) define the specific technologies within each general type of response that may be applicable at the site.

Specifically, this step will be conducted in two discrete tasks as described below. This activity will rely heavily on data assembled as part of the RI activities, published information contained in EPA guidance on remedial actions, and other published sources of information, along with past experience with site remediation at other contaminated sites. The results of this activity will be the identification of a comprehensive list of remedial technologies within each of the classes of response that may be potentially applicable to specific site problems.

4.1.2.1 Task 1.2.1 - Identify Preliminary Categories of Response

The purpose of this task is to identify broad classes of remedial responses that may be applicable to each group of sites at HPA. The specific classes of response to be considered will be selected from the following list prepared by EPA (1985) in the FS Guidance Document:

- No action
- Containment
- Collection
- Diversion
- Complete removal
- Partial removal
- On-Site treatment
- In situ treatment
- Storage
- On-site disposal
- Off-site disposal
- Alternative water supplies
- Relocation of receptors
- Land use controls
- Innovative technologies

Preliminary selection will be based on site data collected during the evaluation of existing literature, summary of previous response actions, and the site investigations performed as part of RIs.

4.1.2.2 Task 1.2.2 - Identify Potential Remedial Technologies

This task will identify remedial technologies based on the classes of response actions summarized in Task 1.2.1. These technologies will address site-specific conditions. Wherever possible, site-specific technologies will be identified based on the results of the RI and will subsequently be refined as more data become available. Table 1 summarizes the potential hazards at each site and the associated remedial technology category for each site. This information was gathered from the previous studies conducted at HPA, the Scoping Document (*HLA, 1988a*) and the Site Safety Plan (*HLA, 1988b*). Table 2 summarizes the range of potential remedial technologies as presented in the FS Guidance Document (*EPA, 1985*). In addition to this summary, the Navy will draw upon experience (past and present) at similar hazardous waste sites, Navy contacts with various contractors and vendors, along with published literature to develop a list of possible remedial technologies.

The following items will be considered for each remedial technology:

- Remedial response objectives
- General class of response (e.g., containment, partial removal, in situ treatment, etc.)
- Class of technology (e.g., capping, pumping, treatment of aqueous waste streams, etc.)
- Functional Rationale (e.g., upgradient, downgradient, chemical treatment, physical treatment, etc.)
- Material and construction options (e.g., clay, synthetic material, granular activated carbon, or powdered activated carbon, well points, or deep wells, etc.).
- Containment and disposal requirements (e.g., treatment or disposal of spent carbon used in a treatment process, containment of injected solutions used for in situ treatment, etc.).

- Status of the technology as applied to remediation at hazardous waste sites (i.e., conventional, demonstrated, developmental, or conceptual).
- The application of the specific technology to source control and/or management of migration options.
- Site data required to evaluate the applicability of the technology and whether these data are available from the existing site data or if the data will be obtained in the RI.
- Site or waste characteristics data that indicate that a specific technology would be of limited use or alternatively would be strongly applicable at the site.
- The application of the specific technology to site problems, specifically whether it possesses a strong probability of mitigating one or more site problems (primary technology), whether it would mitigate the adverse effects or otherwise be required as an ancillary operation to a primary technology (secondary technology), or whether it is not applicable based on the nature of the wastes, contaminants, or site conditions.

4.1.3 Task 1.3 - Screen Technologies and Develop Remedial Alternatives

The list of remedial technologies assembled in Task 1.2.2 will be screened with respect to their ability to achieve the RROs established in Task 1.1, and subsequently, the technologies will be assembled in combinations to form remedial alternatives. The end result of this activity will be the identification of potential remedial alternatives that are capable of mitigating specific site conditions identified in the RI.

The first step in developing remedial alternatives is to qualitatively evaluate the ability of each technology, in whole or in part, to achieve the RROs. During this screening effort, the technical suitability of individual technologies, based on site conditions, waste characteristics, the nature and extent of environmental contamination, and acceptable engineering practice, will also be considered.

The resulting list of remedial alternatives will then be examined with respect to the RROs. Alternatives that are similar will be combined, with individual variations being retained as material or design options to the alternative. The resulting alternatives

will then be examined to assure that at least one, preferably more, alternatives have been defined within each of the following five categories mandated by the NCP:

- Alternatives that include treatment or disposal at an off-site facility as appropriate.
- Alternatives that attain applicable or relevant and appropriate requirements (ARARs), specifically federal and state public health and environmental standards.
- Alternatives that exceed ARARs.
- Alternatives that do not attain ARARs but reduce the potential or existing threats from hazardous substances at or originating from the site.
- A no action alternative.

The initial examination will verify that the alternatives are sufficiently unique to allow for a wide range of potential benefits.

4.2 Task 2.0 - Conduct Initial Screening of Alternatives

During the second task of the FS, the remedial alternatives will be screened based on effectiveness, implementability, and estimated cost. Alternatives that are not anticipated to provide adequate protection of public health, welfare, and the environment based on the preliminary ARARs will be identified and eliminated from further consideration. Similarly, alternatives that may result in adverse environmental or public health impacts that cannot be mitigated or otherwise reduced will also be eliminated from further consideration. Alternatives that are more difficult to implement, offer a lesser degree of remediation or protection, or are expected to take substantially longer to achieve results than other alternatives with approximately similar anticipated costs, may also be eliminated.

The end product of this initial screening will be the identification of remedial action alternatives that will be subjected to detailed evaluations in Task 3.0 of the FS.

4.2.1 Task 2.1 - Perform Technical, Environmental, and Public Health Screening of Alternatives

Each remedial alternative will be examined by assessing its major advantages and disadvantages in terms of technical limitations, its potential to achieve the remedial response objectives, and its beneficial or adverse affects. Possible technical limitations might include the lack of suitable space or the required amount of space to construct an alternative, or a large number of unknown factors associated with an undemonstrated, conceptual, or developmental technology such that a reasonable estimate of its effectiveness or potential cost cannot be determined.

The potential to achieve the RROs will be evaluated by estimating the degree of cleanup containment, or management of contamination, that each alternative offers. The ability of each alternative to address all contaminant migration pathways and points of exposure will be assessed. As part of this effort, a preliminary list of ARARs will be updated and finalized. The anticipated concentrations of the various contaminants at each of the potential receptors after remediation will be roughly estimated in a qualitative manner. These estimated concentrations will be compared to the various ARARs to determine whether the alternatives possess the potential to adequately protect the environment and public health. Based on the results of the technical, environmental, and public health evaluations, the remaining alternatives will be separated into groups representing alternatives offering similar benefits.

4.2.2 Task 2.2 - Prepare Preliminary Cost Estimates

Preliminary estimates of capital and operations and maintenance (O&M) costs will be developed for each alternative that passes the technical, public health, and environmental screening. These cost estimates will primarily be based on experience with similar projects that are ongoing or have been completed. In addition, published

cost data prepared by EPA, its contractors, construction industry standard cost indices, and subcontractor cost estimates will be used. Design or unit cost assumptions that significantly impact the total cost estimate of an alternative will be identified.

A present worth analysis will be prepared to allow alternatives with different levels of capital and O&M costs to be compared on an equal basis. Experience has shown that although a 10 percent rate is generally acceptable, the sensitivity of the present worth value should be examined by using 4 percent and 7 percent discount rates also. This approach is consistent with that recommended in the FS Guidance Document (*EPA, 1985*).

The resulting cost estimates will be compared for alternatives within each group of alternatives offering similar benefits. Alternatives will be compared on the basis of capital costs, O&M costs, and present worth. The most cost-effective alternative within each group will be identified. Alternatives offering similar benefits with similar estimated costs will also be identified. Finally, alternatives within each group that display the highest estimated costs for similar levels of benefit will be identified and the major cost components, along with any assumptions that may affect the accuracy of the estimate, will also be identified.

4.3 Task 3.0 - Prepare Detailed Evaluation of Alternatives that Meet Initial Screening Criteria

This task will comprise an evaluation of each alternative and preparation of a summary of the evaluation, to be incorporated in the draft FS report. The end result of this activity will be a detailed characterization of the relative merits and costs associated with each alternative. This information will form the basis for selection of a preferred alternative.

4.3.1 Task 3.1 - Evaluate Alternatives

On the basis of the results of the initial screening of alternatives performed in the previous activities, a limited number of alternatives will be subjected to detailed evaluation. The following is an outline of criteria expected to be incorporated into the alternative evaluation.

Task 3.1.1 - Technical Evaluation

Task 3.1.2 - Environmental Assessment

Task 3.1.3 - Public Health Analysis

Task 3.1.4 - Institutional Issues

Task 3.1.5 - Cost Analysis

Task 3.1.6 - Cost Summary

4.3.1.1 Task 3.1.1 - Technical Evaluation

The technical evaluation will consider four main criteria:

- Performance - including anticipated effectiveness and useful life
- Reliability - including O&M requirements and demonstrated performance
- Implementability - including constructability relevant to site conditions, external conditions, and time requirements for implementation and results to be achieved
- Safety - in terms of remedial action workers, nearby residents and workers, and O&M personnel.

Anticipated performance of each alternative will be evaluated in terms of its ability to prevent or minimize substantial danger to public health, welfare, and the environment, and the length of time the alternative will provide this protection. The ability of each alternative to attain or exceed the ARARs defined in FS Task 2.2 or meet the conditions involving waiver of ARARs will also be assessed. Each alternative will

also be evaluated in terms of its ability to permanently reduce the toxicity, mobility, or volume of contaminants at each site.

The anticipated reliability of each alternative will be evaluated by assessing the availability and costs of labor and materials associated with O&M activities and the frequency and complexity of these activities.

Implementability will be evaluated in terms of the ease of installation as controlled by site conditions and conditions external to the sites. The time required for installation and for the anticipated beneficial effects to be achieved will also be estimated.

Finally, the potential safety issues relevant to the workers involved in remedial activities and the nearby residents, workers, and businesses will be assessed.

4.3.1.2 Task 3.1.2 - Environmental Evaluation

The environmental evaluation will focus on two main factors:

- The beneficial effects of each alternative in terms of its ability to eliminate or reduce actual or potential damage to the environment
- The potential adverse effects of each alternative along with mitigative methods and costs of mitigation for these effects.

In assessing the beneficial effects of each alternative, the environmental evaluation will focus on specific site problems and contaminant pathways and evaluate both short- and long-term benefits. The assessment will address:

- Changes in the release of contaminants
- Anticipated final environmental conditions
- Improvements in the biological environment
- Improvements in resources utilized by the public.

These post-remediation conditions will subsequently be compared to the baseline conditions anticipated under the no action alternative.

The adverse effects that may be associated with each alternative will be evaluated by assessing the potential for:

- Increased airborne emissions
- New contaminant discharges to surface or ground water
- An increase in the volume of pollutant loading from existing sources or the unit operations associated with each alternative
- Significant adverse effects on the environment or human uses of the environmental resources
- Adverse effects associated with each alternative, each unit operation, alternative construction methods, and alternative operational procedures.

The anticipated adverse effects will be classified as inevitable, probable, possible, and remote, and also as reversible or irreversible. For those alternatives presenting the possibility of inevitable, probable, or irreversible adverse effects, potential mitigative measures will be identified. This will include discussions of primary and/or secondary actions that may be employed, their anticipated effectiveness in reducing adverse effects, their integration with the primary action proposed for the alternative including any potential to affect the overall success of the alternative, and any additional cost factors associated with the mitigative measures.

4.3.1.3 Task 3.1.3 - Public Health Analysis

The public health analysis will be conducted in conjunction with the Public Health and Environmental Evaluations (PHEEs), which are described in Volume 6 - of the Work Plan. The FS public health analysis will provide a summary of environmental concerns associated with each of the considered remedial alternatives. The public health analysis will be divided into four subsections listed below:

- Baseline evaluation
- Exposure assessment
- Standards analysis
- Evaluation of alternatives.

The baseline evaluation will include, at a minimum, discussions of the types and amounts of chemicals at each site, their toxic effects, proximity of target populations, probability of chemical release and migration from the site, and the potential for exposure.

The Exposure assessment will be performed to estimate the frequency, magnitude, and duration of human exposure to toxic chemical contaminants released from the site during or after remedial actions and will:

- Identify chemicals present at the site and select indicator chemicals (based on toxicity, persistence, mobility, and quantity present)
- Identify points of potential human exposure and exposure pathways for each remedial alternative considered
- Characterize populations potentially at risk
- Estimate at all exposure points, the environmental concentrations of each indicator substance for each remedial alternative.

During the Standards analysis, estimated concentrations of the indicators will be compared to the state and federal ARARs previously identified. These ARARs may include:

- Primary Drinking Water Standards
- Acceptable Cancer Risk Levels
- Recommended Maximum Contaminant Levels
- Ambient Air Quality Standards

- Federal and State Water Quality Criteria
- EPA Health Advisories - Suggested No Adverse Response Level (SNARLs).

The final step of the public health analysis will be to evaluate the effects of each of the alternatives. Specific alternative design goals may be developed based on the ARARs.

4.3.1.4 Task 3.1.4 - Institutional Evaluation

Each alternative will be evaluated based on relevant institutional needs including:

- Regulatory requirements
- Permitting requirements
- Community relations.

Each alternative will be evaluated in terms of the CERCLA requirements relative to attaining or exceeding ARARs or reducing impacts and the promotion of permanent solutions resulting from reductions in the volume, toxicity, or mobility of hazardous substances at the site. Potential regulatory requirements include Resource Conservation and Recovery Act (RCRA), CERCLA, Toxic Substances Control Act (TSCA), Safe Drinking Water Act (SDWA), Clean Water Act (CWA), Occupational Safety and Health Act (OSHA), and applicable state regulations, along with other environmental standards, and other criteria identified during the ARARs evaluation.

CERCLA does not require environmental permits for on-site remedial actions taken pursuant to Sections 104 or 106. However, permits may be required for off-site removal, storage, disposal, or treatment actions.

Each alternative will be assessed in terms of the permitting and regulatory requirements that may be required during each phase (design, construction, startup,

operation, shutdown, and completion) of implementation of the preferred remedial alternative.

4.3.1.5 Task 3.1.5 - Cost Analysis

Each remedial alternative will be evaluated in terms of its direct and indirect capital costs; O&M costs (annual and total), and present worth analysis. The Navy will rely heavily on past experience in scoping, costing, and implementing remedial actions at hazardous waste sites similar to HPA. This factor will enable the cost analysis to include the most current prices for the preferred technologies and take advantage of experience gained during system implementations.

In addition to this information, cost estimates will be further adjusted where needed according to standard cost data published by EPA (1984), the construction industry, remedial action contractors, and equipment and service vendors. Preliminary cost estimates developed using published sources will be refined and verified by contact specific vendors for more precise cost data. Emphasis will be placed on services and equipment currently available in the Bay Area whenever possible.

The total of the detailed cost analysis is to provide -50 to +100 percent cost estimates wherever possible. The accuracy of the cost estimates will be qualitatively evaluated. The impact of the potential accuracy of the estimates will be evaluated using a sensitivity analysis over the range of potential costs presented in the literature.

The final aspect of the cost evaluation will be to perform a present worth analysis to evaluate the effects of O&M and replacement/repair costs over time. This evaluation will be done initially assuming a 10 percent discount rate and a 30-year period of performance (design life). Variation in discount rate and design life and the

resultant impacts on annual and total O&M costs and present value will be evaluated for each alternative.

4.3.1.6 Task 3.1.6 - Cost Summary

A tabular summary of the cost estimates developed for each alternative will be prepared. This summary table will include total capital cost, present worth, and cash flow for the life of the alternative. The principal components of both capital and O&M costs will also be tabulated. Any major assumptions or unknowns that affect the reliability or accuracy of the estimates will be identified.

The Navy proposes to include an estimate of the general and administrative costs associated with the operator of the alternative as part of the O&M costs. The purpose of the FS is to develop cost estimates that will be -50 to +100 percent level of accuracy that can be used for comparative purposes only. Detailed cost estimates that can be used for budgetary planning and financing purposes are part of the detailed remedial design efforts to be performed during the remedial design/remedial action efforts conducted after the RI/FS is complete. Thus, the Navy considers the development of cost estimates suitable for these purposes to be beyond the scope of the RI/FS program.

4.3.2 Task 3.2 - Summarize Evaluation of Alternatives

At the completion of the detailed evaluation of each alternative, a summary will be developed for each of the above subtasks that discusses the relevant ranking of each alternative in terms of the various factors considered. These factors will include, at a minimum, the following seven factors:

- Present worth
- Health information
- Environmental effects

- Technical aspects
- Achievement of objectives
- Community effects
- Other considerations.

4.3.3 Select Preferred Remedial Action Alternatives

This task will include the selection of preferred remedial action alternatives based on the previous analysis and summaries.

4.4 Task 4.0 - Prepare Feasibility Study Report

The FS report will be prepared in two steps. A draft FS report will be prepared at the completion of FS Task 3.0 and following receipt of comments on the draft.

The final FS report will be prepared upon receipt of comments on the draft FS.

4.4.1 Draft Feasibility Study Report

The Navy will prepare a detailed draft report documenting the procedures and results of the FS. The structure of this report will parallel the structure of the project tasks. Table 3 presents a proposed outline for the FS report.

4.4.2 Final Feasibility Study Report

On the basis of comments from the regulatory agencies, the draft FS report(s) will be revised. Also, based on input from the EPA, the preferred remedial action alternative will be discussed in detail, including the rationale for its selection (proposed Section 5.3 of the FS report). Following receipt of comments from the regulatory agencies and a public review period regarding the preferred remedial action alternative,

a draft Remedial Action Plan (RAP) will be prepared which summarizes the chosen remedial action alternative and the rationale for the decision. The HPA RAP is intended to be equivalent to the Record of Decision (ROD).

5.0 REFERENCES

U.S. Environmental Protection Agency, 1983. The Remedial Action Costing Procedures Manual. Hazardous Waste Engineering Research Laboratory, Cincinnati, Ohio and Office of Emergency and Remedial Response, Washington D.C.

U.S. Environmental Protection Agency, 1984. Draft Compendium of Cost of Remedial Technologies at Hazardous Waste Sites, February 1984.

U.S. Environmental Protection Agency, Hazardous Waste Engineering Research, 1985. Cincinnati, Ohio, and Office of Emergency and Remedial Response, Washington, D.C.

U.S. Environmental Protection Agency, 1985. Remedial Action at Waste Disposal Sites, Office of Emergency and Remedial Response, Washington D.C.

U.S. Environmental Protection Agency, 1985. Guidance on Feasibility Studies Under CERCLA, Hazardous Waste Engineering Research Laboratory, Cincinnati, Ohio, and Office of Emergency and Remedial Response, Washington D.C., April 1985.

Harding Lawson Associates, 1988a. Scoping Document, Remedial Investigation/Feasibility Studies, Hunters Point Annex, San Francisco, California, March 3, 1988.

Harding Lawson Associates, 1988b. Site Safety Plan (Draft), Submitted to U.S. Navy for work to be conducted at Hunters Point Annex, San Francisco, California. April 14, 1988.

DISTRIBUTION

WORK PLAN VOLUME 7
FEASIBILITY STUDY PLAN
REMEDIAL INVESTIGATIONS/FEASIBILITY STUDIES
NAVAL STATION, TREASURE ISLAND
HUNTERS POINT ANNEX
June 22, 1988

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QUALITY CONTROL REVIEWER

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Lisa S. Teague
Project Manager - 3839

TABLES

Table 1. Summary of Existing Potential Hazards and Possible Corrective Actions

Site	Media	Potential Hazards	Remedial Technology Category
IR-1 Industrial Landfill	Soil	VOCs1, SOCs, PCBs, heavy metals, and radioactive isotopes	ABDEH
	Water	VOCs, SOCs, PCBs, heavy metals, and radioactive isotopes	ACGH
IR-2 Bay Fill Area	Soil	Chromium, copper, lead, zinc, asbestos, tetrachloroethene, SOCs, benzo(a)anthracene, bis(2-ethylhexyl)phthalate, PCBs, and radioactive isotopes	ABDEFGH
IR-3 Oil Reclamation Ponds	Soil	VOCs, petroleum hydrocarbons, heavy metals	ABDEFGH
	Water	VOCs, petroleum hydrocarbons, heavy metals	ACGH
	Surface water	Petroleum hydrocarbons	A
IR-4 Scrap Yard	Soil	Copper, lead, zinc, PCBs, and asbestos	EFGH
IR-5 Old Transformer Storage Yard	Soil	PCBs	EFGH
IR-6 Tank Farm	Soil	Petroleum hydrocarbons	EFGH
	Water	Petroleum hydrocarbons	ACGH
IR-7 Sub-Base Area	Soil	Petroleum hydrocarbons, heavy metals, and radioactive isotopes	EFGH
IR-8 Building 503 PCB Spill Area	Soil	Petroleum hydrocarbons and PCBs	EH
	Water	Petroleum hydrocarbons and PCBs	ACGH
IR-9 Pickling and Plate Yard	Soil	Heavy metals and low pH	H
IR-10 Battery and Electroplating Shops	Floor	Heavy metals	H
IR-11 Building 521 Power Plant	Air	Asbestos	BEF

REMEDIAL TECHNOLOGY CATEGORY LEGEND
- A = Surface water controls
- B = Air pollution controls
- C = Leachate and ground-water controls
- D = Gas migration control
- E = Waste and soil excavation and removal and land disposal
- F = Contaminated sediments removal and containment
- G = In situ treatment
- H = Direct waste treatment
- I = Contaminated water supply and sewer line controls

1 VOCs = volatile organic compounds; SOCs = semivolatile organic compounds; PCBs = polychlorinated biphenyls.

Table 2. Remedial Technologies

A. Surface Water Controls

- Capping (see B.)
- Grading
  - Scarification
  - Tracking
  - Contour furrowing
- Revegetation
  - Grasses
  - Legumes
  - Shrubs
  - Trees, conifers
  - Trees, hardwoods
- Diversion and Collection Systems
  - Dikes and berms
  - Ditches and trenches
  - Terraces and benches
  - Chutes and downpipes
  - Seepage basins
  - Sedimentation basins and ponds
  - Levees
  - Addition of freeboard
  - Floodwalls

B. Air Pollution Controls

- Capping
  - Synthetic membrane
  - Clay
  - Asphalt
  - Multimedia cap
  - Concrete
  - Chemical sealants/stabilizers
- Dust Control Measures
  - Polymers
  - Water

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Table 2. Remedial Technologies (continued)

C. Leachate and Ground Water Controls

- Capping (see B.)
- Containment barriers

  Function options

  - Downgradient placement
  - Upgradient placement
  - Circumferential placement

  Material and construction options (vertical barriers)

  - Soil-bentonite slurry wall
  - Cement-bentonite slurry wall
  - Vibrating beam
  - Grout curtains
  - Steel sheet piling

  Horizontal barriers (bottom sealing)

  - Block displacement
  - Grout injection

- Ground water pumping (generally used with capping and treatment)

  Functional options

  - Extraction and injection
  - Extraction alone
  - Injection alone

  Equipment and material options

  - Well points
  - Deep wells
  - Suction wells
  - Ejector wells

- Subsurface Collection Drains

  - French drains
  - Tile drains
  - Pipe drains (dual media drains)

Table 2. Remedial Technologies (continued)

D. Gas Migration Controls (generally used with treatment)

- o Capping (gas barriers)(see B.)
- o Gas collection and/or recovery
  - Passive pipe vents
  - Passive trench vents
  - Active gas collection system

E. Excavation and Removal of Waste and Soil

- o Excavation and removal
  - Backhoe
  - Cranes and attachments
  - Front end loaders
  - Scrappers
  - Pumps
  - Industrial vacuums
  - Drum grapplers
  - Forklifts and attachments
- o Grading (see A.)
- o Capping (see B.)
- o Revegetation (see A.)

F. Removal and Containment of Contaminated Sediments

- o Sediment removal

  Mechanical Dredging
  - Clamshell
  - Dragline
  - Backhoe

  Hydraulic dredging
  - Plain suction
  - Cutterhead
  - Dustpan

Table 2. Remedial Technologies (continued)

Pneumatic dredging

- Airlift
- Pneuma
- Oozer

- Sediment turbidity controls and containment
  - Curtain barriers
  - Coffer dams
  - Pneumatic barriers
  - Capping

G. In Situ Treatment

- Hydrolysis
- Oxidation
- Reduction
- Soil aeration
- Solvent flushing
- Neutralization
- Polymerization
- Sulfide precipitation
- Bioreclamation
- Permeable treatment beds
- Chemical Dechlorination

H. Direct Waste Treatment

- Incineration
  - Rotary Kiln
  - Fluidized bed
  - Multiple hearth
  - Liquid injection
  - Molten salt
  - High temperature fluid wall
  - Plasma arc pyrolysis
  - Cement kiln
  - Pyrolysis/starved combustion
  - Wet air oxidation
  - Industrial boiler or furnace

- Gaseous waste treatment
  - Activated carbon
  - Flares
  - Afterburners

Table 2. Remedial Technologies (continued)

- Treatment of aqueous and liquid waste streams

  - Activated sludge
  - Trickling filters
  - Aerated lagoons
  - Waste stabilization ponds
  - Rotating biological disks
  - Fluidized bed bioreactors

  Chemical treatment

  - Neutralization
  - Precipitation
  - Oxidation
  - Hydrolysis
  - Reduction
  - Chemical dechlorination
  - Ultraviolet/ozonation

  Physical treatment

  - Floor equalization
  - Flocculation
  - Sedimentation
  - Activated carbon
  - Kleensorb
  - Ion exchange
  - Reverse osmosis
  - Liquid-Liquid extraction
  - Oil-water separator
  - Steam distillation
  - Air stripping
  - Filtration
  - Dissolved air flotation

  Discharge to a publicly owned treatment works

- Solids handling and treatment

  - Screens, hydraulic classifiers, scalpers
  - Centrifuges
  - Gravity thickening
  - Flocculation, sedimentation
  - Belt filter presses
  - Filter presses
  - Drying or dewatering beds
  - Vacuum-assisted drying beds

Table 2. Remedial Technologies (continued)

Treatment

- Neutralization
- Solvent
- Oxidation
- Reduction
- Composting

o Solidification, stabilization, or fixation

- Cement-based
- Lime-based
- Thermoplastic
- Organic polymer
- Self-cementing techniques
- Surface encapsulation
- Gasification
- Solidification (i.e., to fly ash, polymers, sawdust)

I. Contaminated Water Supplies and Sewer Lines

o In situ cleaning

o Removal and replacement

o Alternative drinking water supplies

- Cisterns or tanks
- Deeper or upgradient wells
- Municipal water systems
- Relocation of intake

o Individual treatment wells

J. Land Disposal Storage

o Landfills
o Surface impoundments
o Land application
o Waste piles
o Deep well injection
o Temporary storage

Table 3. Proposal Feasibility Study Report Format

EXECUTIVE SUMMARY

1.0 INTRODUCTION
- 1.1 Site Background Information
- 1.2 Previous Investigations
- 1.3 Geologic and Hydrologic Setting
- 1.4 Contaminant Conditions
- 1.5 Nature and Extent of Contamination
- 1.6 Data Deficiencies
- 1.7 Purpose of the Remedial Response
- 1.8 Establishment of Remedial Response Objectives
  - 1.8.1 Procedures Used
  - 1.8.2 Regulatory Considerations
  - 1.8.3 EPA Guidance
  - 1.8.4 Summary of Objectives

2.0 SCREENING OF REMEDIAL TECHNOLOGIES
- 2.1 Summary of Potentially Feasible Technologies
- 2.2 Evaluation Criteria and Procedures
- 2.3 Results of the Evaluation
- 2.4 Technologies Not Recommended for Further Consideration
- 2.5 Summary of Recommended Primary and Secondary Unit Operations

3.0 DEVELOPMENT OF REMEDIAL ALTERNATIVES
- 3.1 Regulatory Requirements
- 3.2 EPA Guidance
- 3.3 Integration and Configuration(s) of Primary and Secondary Unit Operations
- 3.4 Source Control versus Management of Migration Options
- 3.5 Application to Response Objectives

4.0 INITIAL SCREENING OF REMEDIAL ALTERNATIVES
- 4.1 Procedures Used in the Initial Screening
  - 4.1.1 Criteria
  - 4.1.2 Data Sources/Limitations

Table 3. Proposed Feasibility Study Report Format (continued)

- 4.2 Technical, Environmental, Public Health, and Institutional Screening
  - 4.2.1 Alternative 1
    - o Description
    - o Source Control Versus Management of Migration
    - o Ability to Achieve Response Objectives
    - o Potential Adverse Effects
    - o Feasibility/Reliability
    - o Monitoring Requirements
  - 4.2.N Alternative N
- 4.3 Cost Related Screening
  - 4.3.1 Alternative 1
    - o Capital Costs
    - o Operations and Maintenance Costs
    - o Present Value Analysis
  - 4.3.N Alternative N
- 4.4 Summary of Initial Screening of Alternatives

5.0 DETAILED EVALUATION OF ALTERNATIVES

- 5.1 Technical, Environmental, Public Health, and Institutional Analysis
  - 5.1.1 Alternative 1
    - o Technical Evaluation
    - o Environmental Analysis
    - o Public Health Analysis
    - o Institutional Analysis
  - 5.1.N Alternative N
- 5.2 Cost Criteria Evaluation
  - 5.2.1 Alternative 1
    - o Direct Capital Costs
    - o Indirect Capital Costs
    - o Operations and Maintenance Costs
    - o Monitoring Costs
    - o Distribution of Costs Over Time
    - o Present Value Analysis
    - o Sensitivity Analysis
  - 5.2.N Alternative N
- 5.3 Summary of Alternatives

6.0 REFERENCES

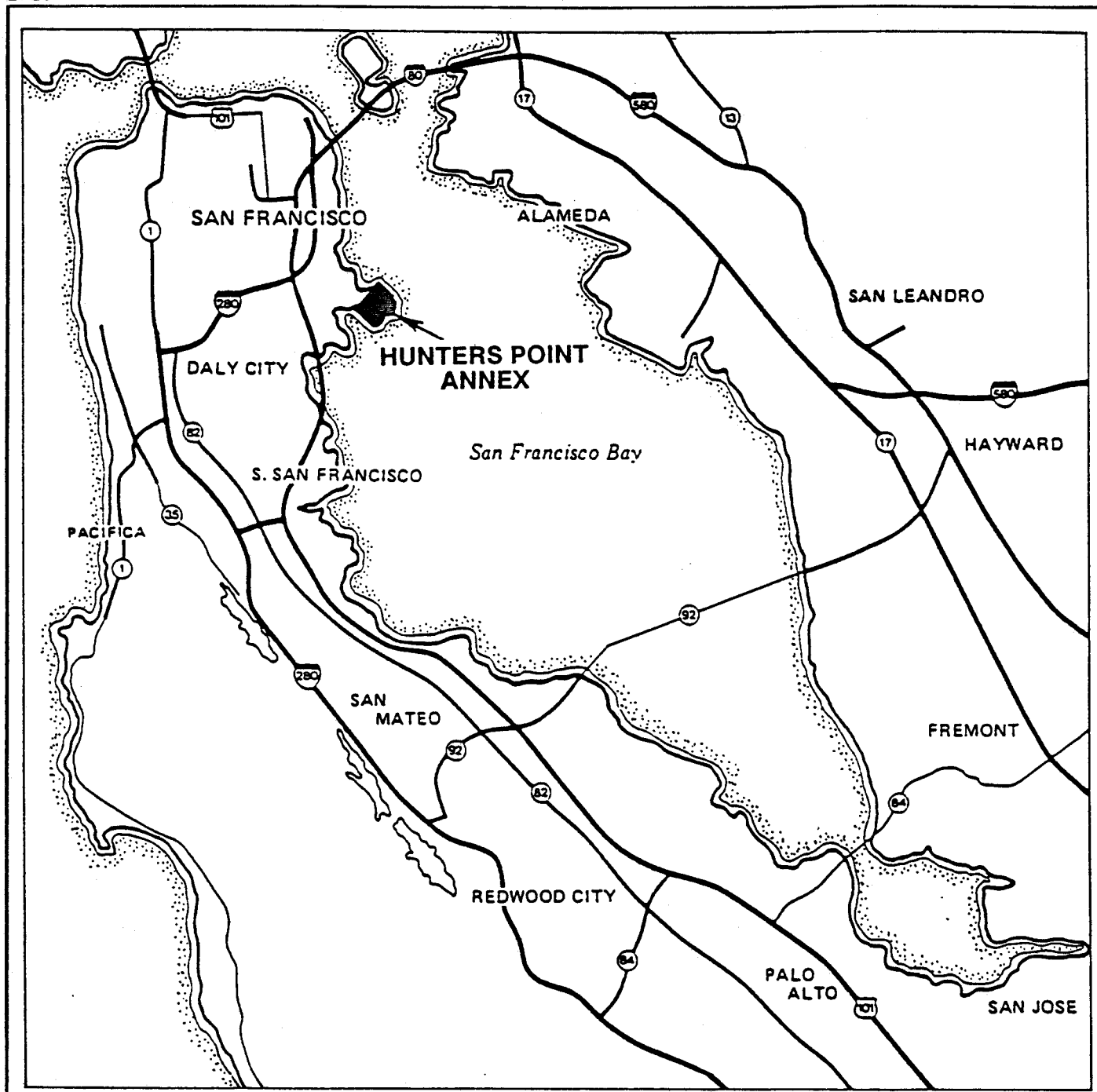
Table 3. Proposed Feasibility Study Report Format (continued)

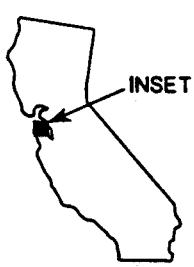
Appendices

A	Evaluation of Remedial Technologies
B	Initial Non-Cost Evaluation of Remedial Alternatives
C	Initial Cost Evaluation of Remedial Alternatives
D	Technical Analysis
E	Environmental Assessment
F	Public Health Analysis
G	Institutional Analysis
H	Cost Analysis of Best Alternatives

ILLUSTRATIONS

2720





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SCALE IN MILES

N

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Location Map
Feasibility Study Plan
Hunters Point Annex
San Francisco, California

DRAFT

PLATE **1**

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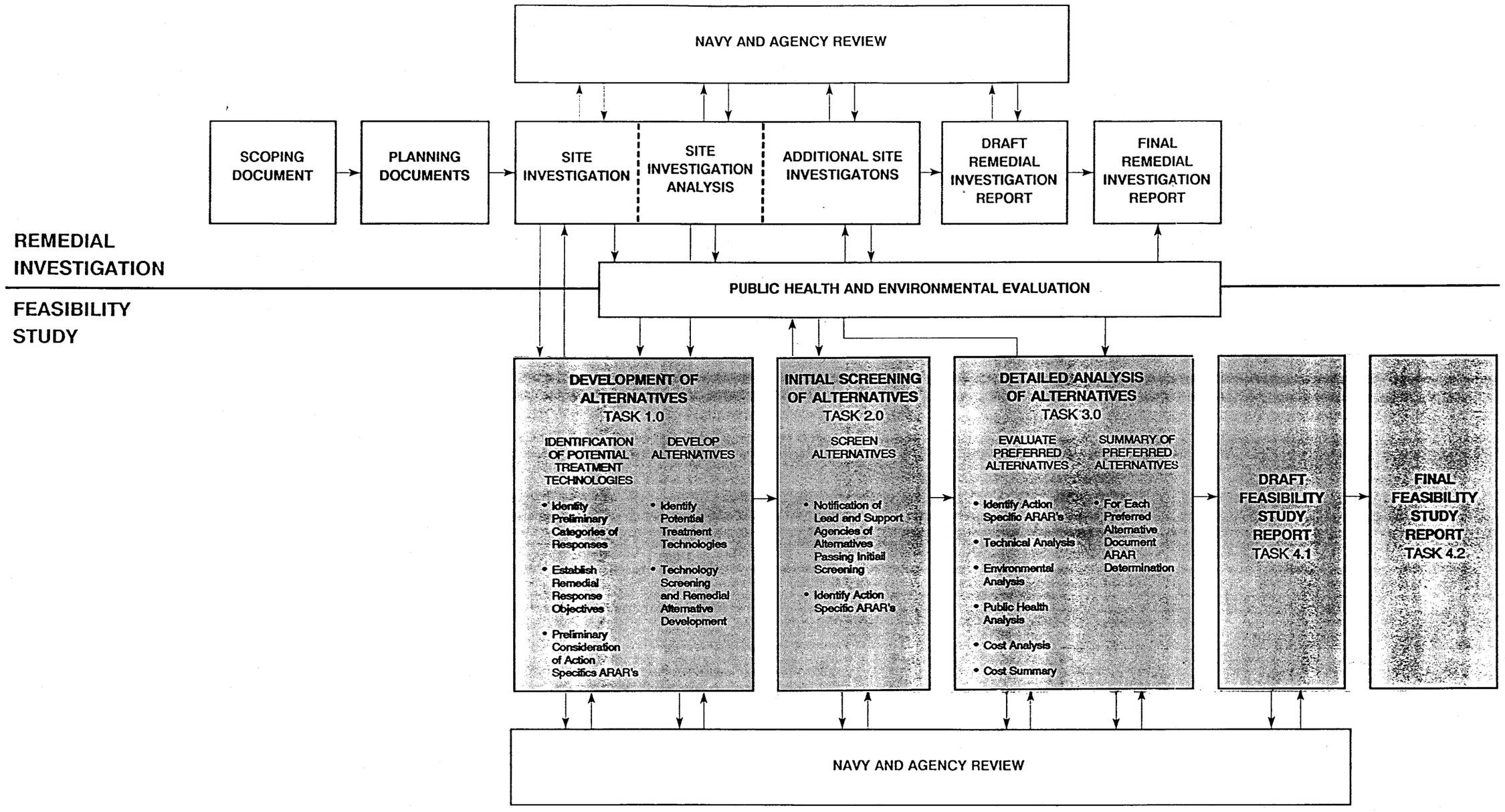

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RI/FS Process
Feasibility Study Plan
Hunters Point Annex
San Francisco, California

PLATE **DRAFT 2**

DRAWN	JOB NUMBER	APPROVED	DATE	REVISED	DATE
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